

HW Hints: p.142-143: 56-59

56) Impulse-Momentum thm.

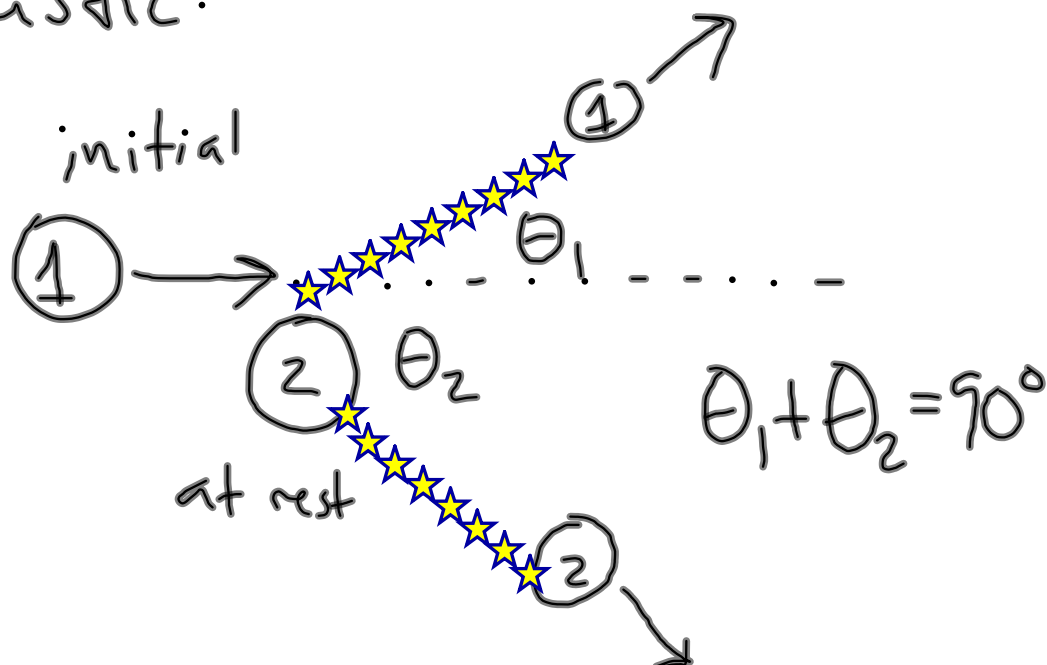
57) perfectly inelastic

58) perfectly inelastic

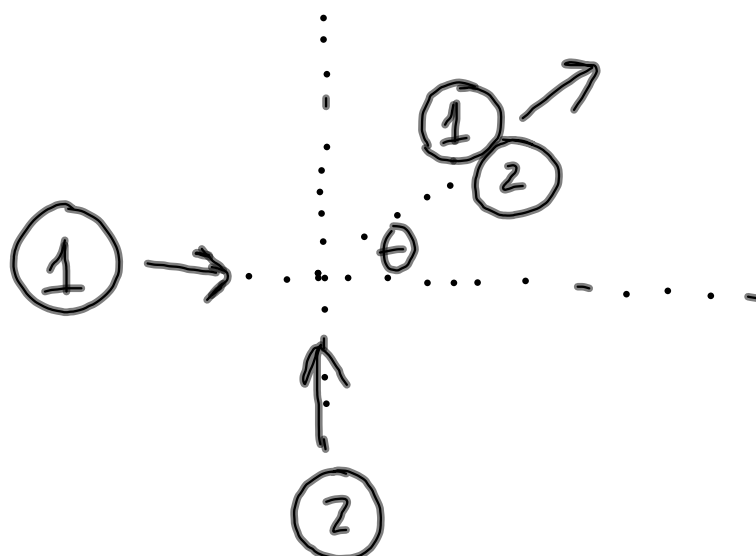
59) conservation of momentum
impulse-momentum

Collisions in 2-D:

- Elastic:



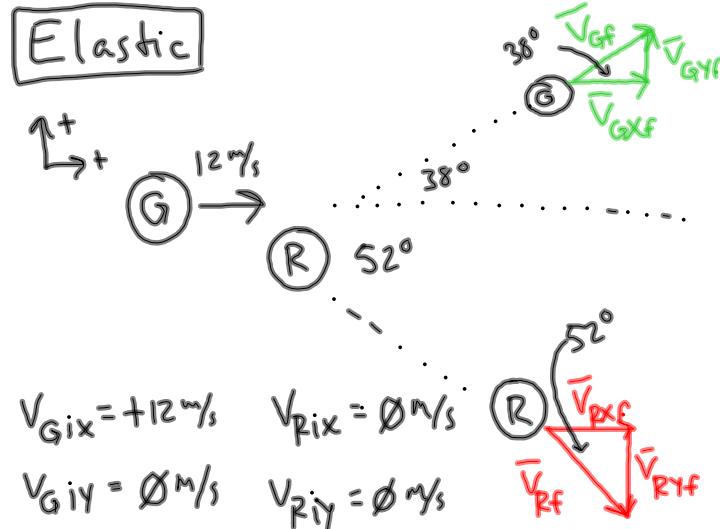
- Inelastic:



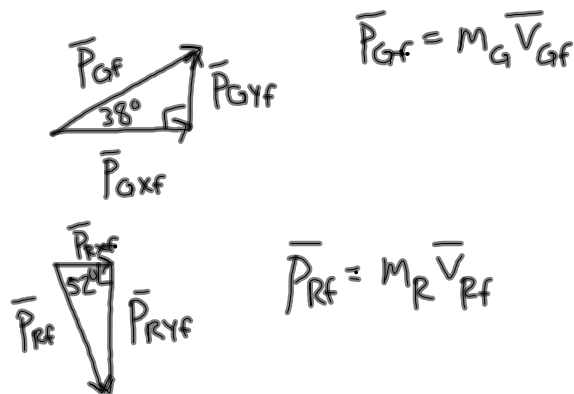
2D Momentum Notes 2.8.12 CP Physics

A green 3.00 kg ball moving 12.0 m/s hits a non-moving 2.00 kg ball. After they hit, the red ball is moving to the right at a 52 degree angle from the green ball's original direction. The green ball is now moving at a 38 degree angle to the left of its original direction.

- a) What is the red ball's final momentum?
b) What is the green ball's final velocity?

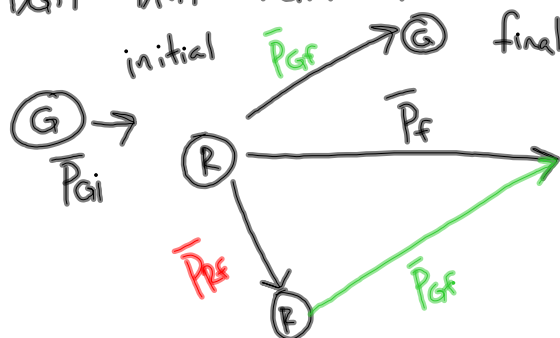


Final Momentum of Green:



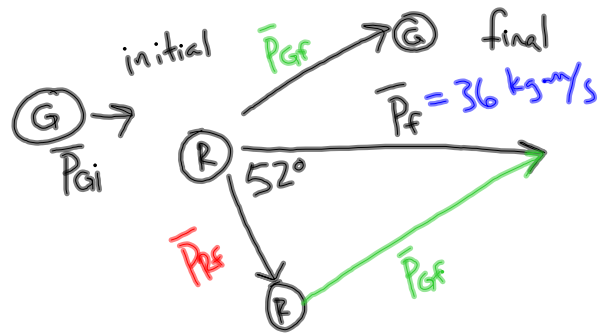
$$\vec{P}_{Gix} + \vec{P}_{Rix} = \vec{P}_{Gfx} + \vec{P}_{Rfx}$$

$$\vec{P}_{Giy} + \vec{P}_{Riy} = \vec{P}_{Gfy} + \vec{P}_{Rfy}$$



final total momentum only comes from green ball initial momentum

2D Momentum Notes 2.8.12 CP Physics



final total momentum only comes from green ball initial momentum

$$\vec{p}_f = \vec{p}_{Gi} = m_G \vec{v}_{Gi} = (3 \text{ kg})(12 \text{ m/s}) = 36 \text{ kg}\cdot\text{m/s}$$

a) Red ball final momentum

$$\cos 52^\circ = \frac{p_{Rf}}{p_f}$$

$$p_{Rf} = p_f \cos(52^\circ)$$

$$= (36 \text{ kg}\cdot\text{m/s}) \cos(52^\circ)$$

$$= 22.2 \text{ kg}\cdot\text{m/s}$$

b) find Green final velocity

$$\sin(52^\circ) = \frac{p_{Gf}}{p_f}$$

$$p_{Gf} = p_f \sin(52^\circ)$$

$$= (36 \text{ kg}\cdot\text{m/s}) \sin(52^\circ)$$

$$= 28.4 \text{ kg}\cdot\text{m/s}$$

$$p_{Gf} = m_G v_{Gf}$$

$$v_{Gf} = \frac{p_{Gf}}{m_G}$$

$$= \frac{28.4 \text{ kg}\cdot\text{m/s}}{3 \text{ kg}}$$

$$= 9.47 \text{ m/s}$$